

Lesson 6.1, continued

c. cube roots of 1: $1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}$;
 cube roots of 8: $2, \frac{-2 + 2i\sqrt{3}}{2} = -1 + i\sqrt{3}$,
 $\frac{-2 - 2i\sqrt{3}}{2} = -1 - i\sqrt{3}$; cube roots of 64:
 $4, \frac{-4 + 4i\sqrt{3}}{2} = -2 + 2i\sqrt{3}, \frac{-4 - 4i\sqrt{3}}{2} =$
 $-2 - 2i\sqrt{3}$ 6. 78 vibrations/sec to 1047
 vibrations/sec 7. 28 vibrations/sec to 4186
 vibrations/sec 8. about 5 notes above A-440;
 about 7 notes below A-440 9. The frequency of a
 note one octave above another note is twice that of
 the original note.

Lesson 6.2

Teaching Guide

1. Add the exponents. m^9 ; product of powers
 property 2. $m^{3/4} \cdot m^{3/4} \cdot m^{3/4} \cdot m^{3/4}; m^3$
 3. $p^{1/2} \cdot p^{1/2} \cdot p^{1/2}; p^{3/2}$ 4. Let m and n be
 rational numbers. $(a^m)^n = a^{mn}$

Investigating Algebra Activity

1. $\sqrt[n]{a \cdot b} = (a \cdot b)^{1/n} = a^{1/n} \cdot b^{1/n} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
 2. The root of a product is equal to the product of
 the roots.
 3. $\sqrt[n]{\frac{a}{b}} = \left(\frac{a}{b}\right)^{1/n} = \frac{a^{1/n}}{b^{1/n}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}, b \neq 0$
 4. The root of a quotient is equal to the quotient
 of the roots. It is important to state that $b \neq 0$,
 because division by 0 is undefined.

Practice Level A

1. 25 2. $3^{5/3}$ 3. $4^{2/3} \cdot 3^{2/3}$ 4. $\frac{1}{7^{3/2}}$ 5. $9^{1/5}$
 6. $\frac{5^{1/6}}{4^{1/6}}$ 7. $\sqrt{10}$ 8. 14 9. 3 10. $\frac{2}{3}$
 11. 10 12. $\sqrt{14}$ 13. $x^{5/3}$ 14. $x^{4/5}$ 15. $x^{3/4}$
 16. $2x^{1/3}$ 17. $\frac{1}{x^{4/3}}$ 18. $\frac{1}{x^{5/2}}$ 19. $x^{2/3}$ 20. $\frac{1}{x}$
 21. $\frac{16}{x^{2/3}}$ 22. $4\sqrt{5}$ 23. $3\sqrt{7}$ 24. $7\sqrt[5]{13}$
 25. $3\sqrt{5}$ 26. $26\sqrt{3}$ 27. $5\sqrt[3]{2}$ 28. $-5\sqrt{x}$
 29. $7\sqrt[3]{x}$ 30. $-10\sqrt[4]{x}$ 31. $8x\sqrt{x}$ 32. $\frac{\sqrt{x}}{x}$
 33. $xyz\sqrt[3]{yz^2}$ 34. $2xy^2z\sqrt[3]{z}$ 35. $4yz\sqrt{xz}$
 36. $\frac{z^2\sqrt[3]{x^2yz}}{y}$ 37. $2\sqrt{3}$

Practice Level B

1. $7^{5/3}$ 2. $4^{1/3}$ 3. $6^{1/2}$ 4. $15^{1/4}$ 5. 2 6. $2\sqrt[4]{2}$
 7. $11^{3/4}$ 8. 7 9. 27 10. $\frac{3\sqrt[3]{2}}{4}$ 11. 2
 12. $\frac{\sqrt[5]{45}}{3}$ 13. x^3 14. $x^{1/5}$ 15. $x^{1/7}$ 16. $\frac{x^{2/3}}{3}$
 17. $2x\sqrt[3]{2x}$ 18. $\frac{1}{x^{6/5}}$ 19. $x^{3/5}$ 20. $\frac{x^4\sqrt[3]{y}}{y}$
 21. $x^5 + \sqrt{3}$ 22. x^6 23. $\frac{x^{2\sqrt{3}}}{2}$ 24. $\frac{1}{x^{23/3}}$
 25. $8\sqrt[3]{5}$ 26. $2\sqrt{5}$ 27. $-6\sqrt{3}$ 28. $9\sqrt{x}$
 29. $2xy^6$ 30. $5x\sqrt[3]{3}$ 31. $xy^2\sqrt[4]{3x^3yz^3}$
 32. $x^2y^2z^2\sqrt{yz}$ 33. $\frac{3\sqrt[3]{3xy^2z^2}}{2yz}$
 34. 1.58×10^9 in. 35. 10 ft

Practice Level C

1. $16 \cdot 5^{9/4}$ 2. $3^{3/2}$ 3. $7^{6/5}$ 4. $5^{1/2}$ 5. 4
 6. $\sqrt[24]{6}$ 7. $\frac{\sqrt{6}}{3}$ 8. $9\sqrt[5]{81}$ 9. $\frac{\sqrt{70}}{35}$ 10. $x^{3\sqrt{3}}$
 11. $\frac{x^4\sqrt[4]{x}}{y^2}$ 12. $x^{1/4}$ 13. $x^{1/3}y^{1/6}$ 14. $\frac{8x^4y^{1/5}}{z^3}$
 15. $\frac{\sqrt[3]{3z^{1/4}}}{x^{1/2}y^{1/3}}$ 16. $\frac{y^{9/2}}{8x^{3/2}z^{3/2}}$ 17. $9x^4\sqrt[4]{x^3}$
 18. $x^{23/120}$ 19. $2\sqrt[4]{3}$ 20. $3x^2z\sqrt[3]{xyz^2}$ 21. $\sqrt[8]{x}$
 22. $\frac{\sqrt[3]{50x + 25\sqrt{x}}}{5}$ 23. $2\sqrt[3]{x}$ 24. $4x^2z\sqrt{xyz}$
 25. 4.29×10^8 in. 26. 4.3 in.

Study Guide

1. 24 2. $10^{2/3}$ 3. $\frac{1}{5}$ 4. 121 5. $9\sqrt{6}$ 6. $4\sqrt[3]{6}$
 7. 5 8. 2 9. $6\sqrt[3]{2}$ 10. $\frac{\sqrt[4]{54}}{3}$ 11. $(8(6))^{1/4}$
 12. $24(6)^{1/2}$ 13. $\frac{3m}{2n^2}$ 14. $4p^4q^2$ 15. $\frac{\sqrt[3]{6xy}}{3y}$
 16. $-2\sqrt{h}$ 17. $7a^{1/2}b$ 18. $y^2\sqrt{5}$

Problem Solving Workshop:

Worked Out Example

1. about 42.2 mm² 2. about 19 mm³ 3. 9 ft
 4. about 1.59; The surface area of the Canadian
 lynx is about 1.59 times as greater as the surface
 area of an average house cat.

Challenge Practice

1. $2\sqrt[4]{2}$ 2. $\sqrt{5}$ 3. $y\sqrt[8]{8x}$ 4. $3ab\sqrt[6]{2ab^3}$

Lesson 6.2, continued

5. $(2x - 1)^{-1/2} \left(2x - \frac{3}{5} \right)$ 6. $(3x + 2)^{3/2} \left(\frac{3}{2}x + 2 \right)$
 7. $\frac{1}{6}(4 + x)^{2/3}(3x - 4)$ 8. $\frac{1}{8}(2x - 3)^{3/2}(2x + 3)$
 9. $\frac{2}{3}x(x^2 + 1)^{-2/3}(4x^2 + 3)$
 10. $\frac{1}{4}(3x + 2)^{-3/2}(x - 6)^{1/2}(38 - 3x)$

Lesson 6.3

Teaching Guide

1. $-x^2 + 7x - 18$ 2. $x^2 - 11x + 42$
 3. $-3x^{1/2} + 9x^{2/3}$ 4. $x^3 + 4x^2 - 6x - 9$
 5. $\frac{125x^3}{y^6}$ 6. $18x^{11/15}$ 7. $\frac{y}{x^3}$ 8. $\frac{4x^2}{y^4}$

Practice Level A

1. $4x^{1/2} + 1$ 2. $-x^{1/2} + 5$ 3. $x^{1/2} + 2$
 4. $-2x^{1/2} + 3$ 5. $-3x^{1/2} + 1$ 6. $5x^{1/2} - 4$
 7. $8x^{11/6}$ 8. $-24x^2$ 9. $-12x^{5/6}$ 10. $2x^{7/6}$
 11. $-\frac{3}{2x}$ 12. $-3x^{1/6}$ 13. 3 14. $\frac{16}{5}$ 15. 1
 16. 48 17. $-\frac{2}{5}$ 18. 8 19. $\frac{2}{2x + 5}$ 20. $x + 1$
 21. $\frac{4}{x - 4}$ 22. $\frac{5x + 4}{x}$ 23. $\frac{-2x + 1}{x}$
 24. $4x + 15$ 25. all real numbers 26. all real numbers except $x = 2$
 27. all real numbers except $x = 2$ 28. all real numbers except $x = -1$
 29. all real numbers except $x = \pm\sqrt{2}$ 30. all real numbers
 31. $P(x) = 0.65x - 15,000$; \$310,000

Practice Level B

1. $6x^{1/2} + 2$ 2. $3x^{1/2} - 1$ 3. $-5x^{1/2} + 5$
 4. $8x^{1/2} - 6$ 5. $-11x^{1/2} + 3$ 6. $3x^{1/2} + 3$
 7. $-12x^{10/3}$ 8. $4x^{5/2}$ 9. $-3x^{11/6}$ 10. $-\frac{4x^{2/3}}{3}$
 11. $\frac{1}{4x^{3/2}}$ 12. $-\frac{1}{3x^{5/6}}$ 13. $\frac{3x + 9}{x + 1}$ 14. $\frac{6}{x + 7}$
 15. $x + 8$ 16. $\frac{3}{2x + 4}$ 17. $x + 4$ 18. $\frac{3x + 3}{x + 4}$
 19. all real numbers 20. all real numbers except $x = -3$
 21. all real numbers except $x = -3$
 22. all real numbers except $x = -\frac{2}{3}$
 23. all real numbers 24. all real numbers
 25. $f(x) = x - 200$ 26. $g(x) = 0.8x$
 27. $g(f(x)) = 0.8x - 160$

28. $f(g(x)) = 0.8x - 200$ 29. pay less with discount first

Practice Level C

1. $2x^2 + x - x^{1/2} - 4$ 2. $6x^2 + 2x^{1/2} - 5$
 3. $4x^2 + x - 5x^{1/2} + 1$
 4. $2x^2 - x + 7x^{1/2} - 6$ 5. $2x^2 - 4x^{1/2} + 5$
 6. $-4x^2 + x - 3x^{1/2} + 1$ 7. $-3x^{5/3} - \frac{3}{x^{1/3}}$
 8. $x^{5/2} + x^{1/2}$ 9. $-3x^{1/6}$ 10. $\frac{-x^{7/3} - x^{1/3}}{3}$
 11. $x^{3/2} + \frac{1}{x^{1/2}}$ 12. $-\frac{x^{5/6}}{3}$
 13. $\frac{2 - x^{1/2}}{x}$; positive real numbers
 14. $\left(\frac{3}{x - 1}\right)^{1/2}$; all real numbers greater than 1
 15. $\frac{2x^2 - 7x + 5}{9}$; all real numbers
 16. $\frac{1}{(2x^2 - x)^{1/2}}$;

all real numbers less than 0 and greater than $\frac{1}{2}$

17. $\frac{2x^2 - x - 1}{3}$; all real numbers
 18. $x^{1/4}$; positive real numbers 19. True
 20. False; Sample answer: let $f(x) = x$ and $g(x) = x + 1$ 21. True
 22. False; Sample answer: let $f(x) = x$ and $g(x) = x + 1$
 23. False; Sample answer: let $f(x) = \sqrt{x}$ and $g(x) = x + 1$
 24. False; Sample answer: let $f(x) = x + 1$
 25. Sample answer: $f(x) = \sqrt[3]{x}$, $g(x) = x + 1$
 26. Sample answer: $f(x) = x^3 + 2$, $g(x) = \sqrt{x}$
 27. Sample answer: $f(x) = \frac{x + 1}{x^2}$, $g(x) = x - 1$
 28. Let $f(x) = 0.7x$, $g(x) = x - 10$, $h(x) = 0.9x$
 $f(g(h(x))) = 0.63x - 7$
 $f(h(g(x))) = 0.63x - 6.3$
 $g(f(h(x))) = 0.63x - 10$
 $g(h(f(x))) = 0.63x - 10$
 $h(f(g(x))) = 0.63x - 6.3$
 $h(g(f(x))) = 0.63x - 9$

The store will most likely deduct the \$10 coupon first and then take the 30% and 10% discount in any order.